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EXCAVATION AND REPAIR OF SUN TEMPLE MESA VERDE NATIONAL PARK



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EXCAVATION AND REPAIR OF SUN TEMPLE.

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INTRODUCTION.

By the direction of the Secretary of the Smithsonian Institution, at the request of the Secretary of the Interior, the excavation and repair of ruins in the Mesa Verde National Park were continued during the summer of 1915. The mound which has been heretofore known as Community House, but which should properly be known as Sun Temple, was chosen for excavation, its walls opened and a large building brought to light. The exposed walls were thoroughly repaired in the manner best fitted to resist the action of the elements, which are most destructive in a ruin not protected by the roof of a cave, but exposed to the violent storms and rains of this region.

At the close of a report on field work at Cliff Palace, in 1909, I called attention to a mound of stones on the point of the mesa directly across Cliff Canyon and suggested that it might conceal an ancient pueblo ruin.¹ The majority of stones strewn over this mound showed pecking on their surfaces and other well-marked signs of having been worked artificially, indicating the character of the masonry in the walls of the ancient building buried beneath it. Enough soil had accumulated on the mound formed by these stones to allow the growth of red cedar and pinyon trees, the size of which indicated great age. A small exposed section of wall appeared on the surface on the north side of the mound, where a room had been partially dug out by some person in search of relics. Although the shape of the building, if any, which might exist under the mound was not apparent at that time, the number of artificially worked stones and their well-dressed surfaces indicated the existence of a large building, like a pueblo, and as such it was referred to in the report on Cliff Palace. My interest in this mound of earth and stones was so great that I desired greatly to solve the mystery, and when an opportunity came to renew my work on the ruins of the Mesa Verde National Park, I naturally chose it for my operations.

The mound presented several advantages for work, for whatever building it concealed could be conveniently seen by tourists or students of archaeology visiting Cliff Palace. It was only 2 miles from Spruce Tree House and a short walk from other large ruins.

¹ Bulletin 51, Bureau of American Ethnology, p. 78.

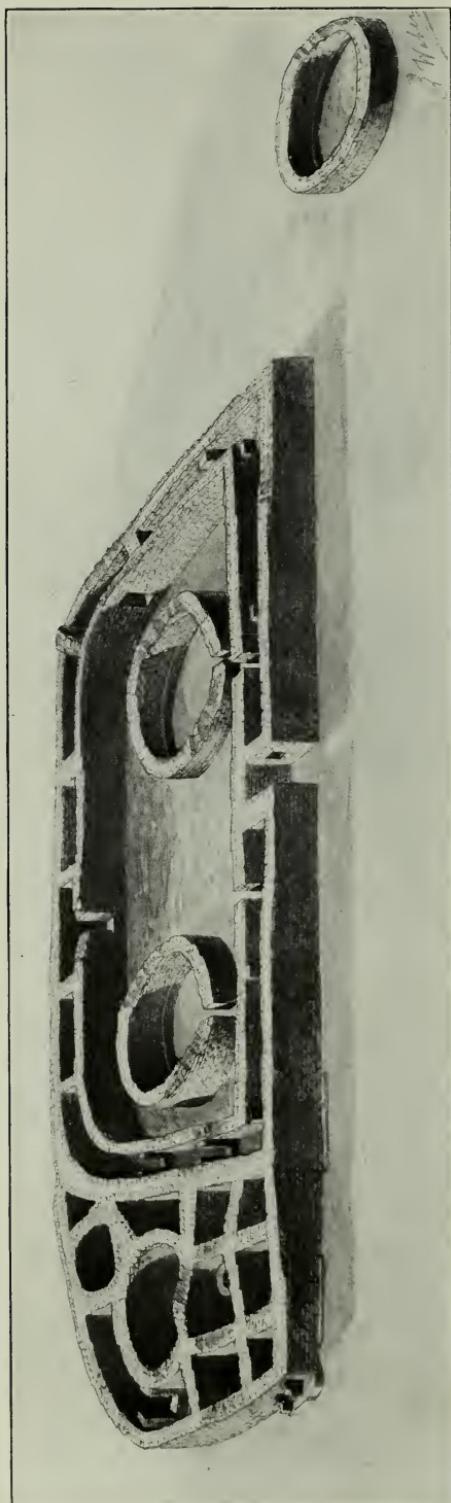


FIG. 1.—BRDSEYE VIEW OF SUN TEMPLE, LOOKING NORTHEAST.

(Scale, $2\frac{1}{2}$ feet to 1 inch.)

A more important consideration was that it presented evidences that the buried building belonged to a unique type of ruin in the Mesa Verde, and gave promise of adding an important chapter to our knowledge of the prehistoric people who formerly made their home in the Mesa Verde National Park. These hopes were realized, and the results of three months' work on this mound were more striking than had been expected. There was brought to light a type of ruin (fig. 1) hitherto unknown in the park, and, as was well expressed by a visitor, the building excavated shows the best masonry and is



FIG. 2.—VIEW OF SUN TEMPLE AND CLIFF PALACE.

(Photograph by T. G. Lemmon.)

the most mysterious structure yet discovered in a region rich in so many prehistoric remains. Although at first there was some doubt as to the use of this building, it was early recognized that it was not constructed for habitation, and it is now believed that it was intended for the performance of rites and ceremonies; the first of its type yet recognized in the Southwest.

The ruin was purposely constructed in a commanding situation (fig. 2) in the neighborhood of large inhabited cliff houses. It sets somewhat back from the edge of the canyon, but near enough to

present a marked object from all sides, especially the neighboring mesas. It must have presented an imposing appearance rising on top of a point high above inaccessible, perpendicular cliffs. The mound is situated on a spur of the picturesque Chapin Mesa separating two deep canyons. From it one can look southward down Soda Canyon to the Mancos River on the banks of which a group of cottonwood trees can be seen on a clear day. This superb view is rivaled by one of almost equal beauty, looking east across Cliff Canyon into the cave in which is situated Cliff Palace, the largest cliff dwelling of the park. In a cave of the precipice below Sun Palace there is a solitary almost inaccessible cliff house, and in a cavern not far up the canyon is Oak Tree (Willow) House, and the mysterious dance plaza, called Painted House.¹ Other cliff dwellings are visible from the ruin, which is practically situated near the central point of a considerable prehistoric population. No better place could have been chosen for a religious building in which the inhabitants of many cliff dwellings could gather and together perform their great ceremonial dramas.

The mound that marked the site of this ruin was not even mentioned in the classic work, *Cliff Dwellers of the Mesa Verde*, by Baron Nordenskiöld; nor has it been regarded as worthy of notice by other early authors. It has been referred to by me as a ruined pueblo, and on the latest map is designated Community House,² a name also applied, by mistake, to a cliff dwelling of some size situated in a cavern on the opposite side of the entrance to Cliff Canyon. The literature of this ruin may then be said to begin, practically, with the present report, although brief mentions of the building may be found in newspapers of the past summer.

GROUND PLAN.

The ground plan, shown in figure 7, has been well compared to the letter D. The building is formed of two sections, the larger of which taken separately is also D-shaped and may be called the original building, while the smaller, forming the west end, is of later (?) construction and may be known as the Annex. The south wall, which is straight, is common to both original building and Annex and extends from the southeast corner of the ruin directly east-west 121.7 feet. The portion of this wall from the recess to the east corner has exactly the same length as that to the junction of the original building with the Annex. The western end of the original building, on the south

¹ On the walls of one of the rooms at the west end of this plaza are found some of the best mural paintings in the Mesa Verde.

² The name "Community House" is not the best designation for this ruin. It was not intended as a secular house, but more likely a sacred edifice, and might with perfect propriety be called a ceremonial building. There are evidences that will appear later that a shrine on the southwest corner was used in sun worship.

side, is indicated by a well-made corner line and is marked by an offset in the foundation. The junction of the original building and the beginning of the Annex wall are not apparent in the masonry of the north wall, but are indicated on the stones of the wall. The fine curved north wall of the original building and of the Annex blend so perfectly that the vertical line of their junction can not be made out in the masonry, but is indicated by an incised cross that was evidently placed there for this definite purpose.

The foundation walls of the building, throughout most of their length, rest on the solid rock of the cliff. There are about 1,000 feet of walls in the whole building and its inclosed kivas; it has 28,000 cubic feet, or 1,292 perches, of stone masonry in its present condition, and had not far from 1,900 perches before the walls began to crumble.

The width of the ruin at its widest portion is 64 feet. The walls average 4 feet in thickness, and are composed of a central core made of rubble and adobe, with two facings made of well-dressed rock, which, however, were not tied into the core and present a serious architectural defect.

Pueblo ruins of D-shape are rare in the Southwest; the best known being Pueblo Bonito in the Chaco Canyon, New Mexico, one of the largest of an instructive group of buildings. The masonry of Pueblo Bonito, according to Jackson,¹ is quite dissimilar in different regions of the walls, "showing clearly that it was either built at different periods, or that it has been partly demolished and then rebuilt."

In that respect, as well as others, Pueblo Bonito and Sun Temple are alike. Although there are some slight differences in the masonry of the Annex and the main building, as a whole all the walls are uniformly well made. The rooms in Pueblo Bonito were constructed at intervals and vary in workmanship, the resultant ground plan becoming D-shaped. The D-shaped plan (fig. 3) of Sun Temple was not due to successive additions, but was intentional from the first work upon its foundation. The kivas in the original building resemble those of Chaco Canyon ruins, but the kiva of the Annex has surrounding rooms that remind one of the semicircular "towers" inclosed by a wall, with partitions separating encircling apartments like those reported as common in Ruin Canyon and the Mancos Valley.

NUMBER OF ROOMS AND DIMENSIONS.

The rooms in this building vary in form and type, one kind being circular, the other rectangular. The circular rooms are identified as kivas or sacred rooms; the purpose of the rectangular room is unknown. There are two circular rooms or kivas of about equal size in the original building, and a third occupies the center of the Annex.

¹ Report on ancient ruins examined in 1875 and 1877: Tenth Ann. Rept. U. S. Geol. Surv. Terr., 1879.

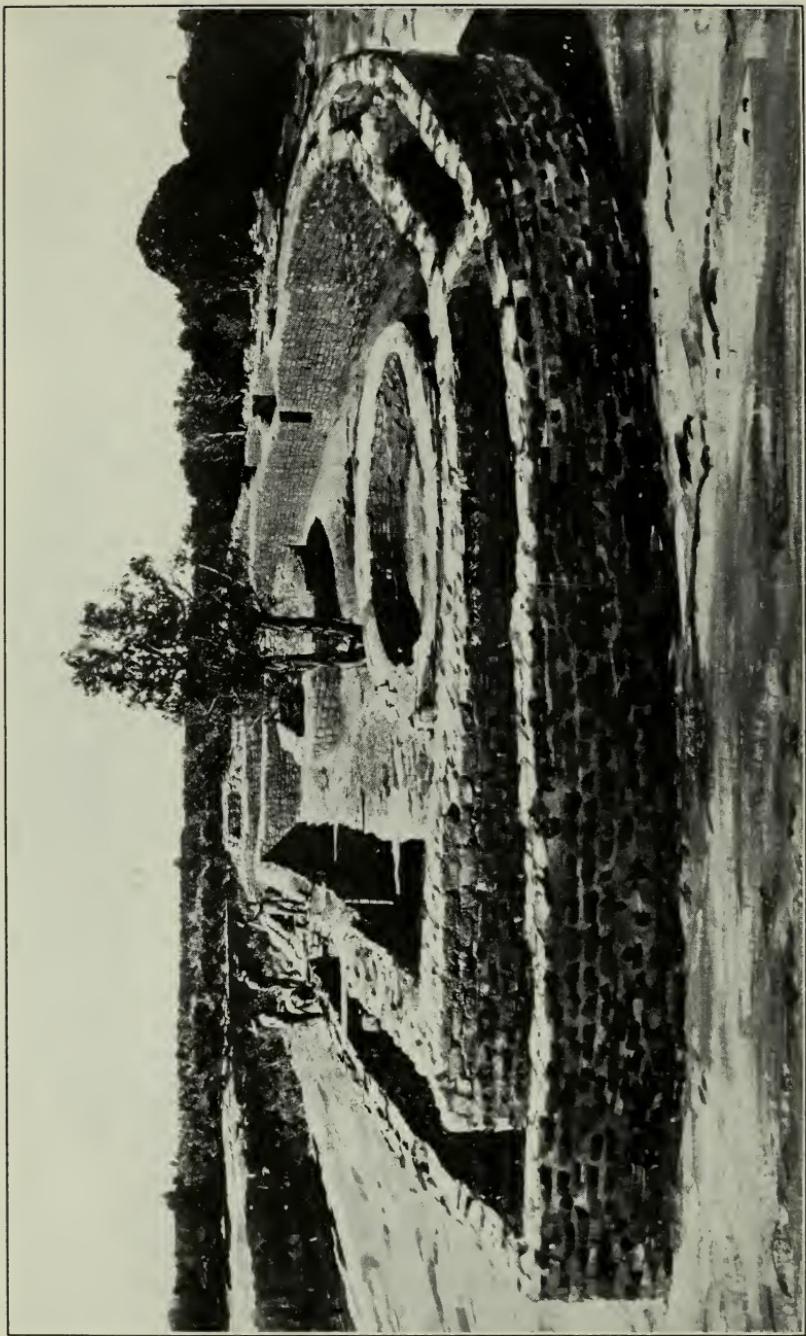


FIG. 3.—INTERIOR OF RUIN, LOOKING WEST.
(Restoration by W. H. Holmes from photograph by Fred Jeep.)

A circular pit, not a kiva, the function of which is unknown, lies a few feet east and north of kiva A not far from the junction of the original building and the Annex. The walls of this room were constructed of rough, undressed stone, and when its interior was cleaned out the room was found to be filled with undressed stones varying in size from a handful to a small fragment. There are 23 other rooms; 14 of these are in the original building. Several of these have curved walls, others are parallel and straight. Of the rooms with curved walls three had entrances from the roofs, four had lateral doors into the plaza, and the remainder are arranged in two series, the members of which communicate with each other. None of the rooms of the Annex have lateral doorways, although an outside entrance formerly existed in room *y*. The rooms *a*, *b*, *c*, *d*, and *f*; and *o*, *n*, *m*, and *l* of the original building are connected by passageways of peculiar construction. Each passageway in the rooms that are connected has a pilaster on each side, across the tops of which evidently were once laid wooden beams supporting a solid wall of masonry above the doorway. This supported wall has, as a rule, fallen in most cases, but one of the wooden supports with the wall still above it remains in place between rooms *e* and *f*. Although in some instances the height of the wall in several rooms is over 11 feet, there are no rows of holes for the insertion of former wooden floor or roof joists.

Not a single room, either circular or rectangular, shows any signs of plastering, but all joints between stones from the bottom to top were carefully pointed with adobe and generally chinked with stones, the impression of human fingers and palms of small hands of the workmen, probably women, still showing in the clay mortar. No tool of any kind seems to have been employed as a trowel. Probably the builders never intended to plaster the walls, for if this had been done engraved stones set in the wall would be invisible. The stones of the wall were brought to a cubical shape by pecking, the pits made on their surfaces with stone tools showing plainly on every piece. Many were smoothed by rubbing. In some specimens elongated grooves indicate that a chisel held in one hand and struck with a stone hammer was used in fashioning the blocks. The stones used in some of the curved walls had a curved face and slanting sides, their bases and tops being parallel. The component stones rarely overlapped and side walls were not bonded. The principle of the arch was unknown, but the corners were practically perpendicular, implying the use of a plumb bob. The curved walls are among the best in the ruin.

The unnecessarily large quantity of adobe in the joints is a weakness, for it allowed water, whether rain or melting snow, to penetrate between the courses of stones or between the facing and the core. When the water froze the walls were broken apart. This is especially

evident in the upper courses. The large quantity of dressed stones that filled the rooms and banked up against both inner and outer walls proves that the walls were once higher by possibly 6 or 8 feet. It is not surprising that the floors of kivas B and C were not sunk below the plaza level, for to accomplish this would require excavation in solid rock; kiva A is practically subterranean, being surrounded by rooms.

KIVAS.

The rooms in the plaza have circular walls and are identified as kivas. They are unlike the sacred rooms of the neighboring Cliff Palace, the kivas of which are subterranean. There is, however, the foundation of a straight wall that may have been the beginning of a square structure surrounding kiva C. The pedestals or pilasters, by which the roof of a Cliff Palace kiva was supported, are not found in the kivas of Sun Temple, nor are there any banqueting places. The floor shows no signs of fireplaces, deflectors, or ceremonial openings called sipapus, almost universal in cliff-house kivas in the Mesa Verde National Park. It was intended to ventilate the kivas by a walled trench below the floor, shown on the ground plan, extending beneath the wall of kiva A, which no doubt served as a ventilator or ceremonial trench extending under the floor of an adjoining room and finally opening into a vertical shaft, the outer wall of which, made of rough stone, projects into the room z. The walls of the kivas are thick, composed of a central core faced with smooth cubical stones, each about the size of a brick, finely smoothed, but in no instance built to the top of the outer wall.

The two largest kivas, B and C, are situated inside the plaza of the main building at about equal distances from the adjacent walls surrounding the inclosed open space (fig. 4). They are essentially similar in construction, and are free from all other rooms. Both show equally well the facing of small stones lining the large rocks that compose the interior or core of the kiva walls. Each shows on its south margin a narrow subterranean trench with stone walls extending from the plaza outside the kiva to a little more than half way to the middle of the floor. This trench is a form of ceremonial entrance, and is not very unlike a passageway under the floor of kiva K, in Cliff Palace. The absence of deflector and fire hole is probably explained on the theory that the walls of the kivas, like those of the rest of the building, were never completed. There were no signs of beams, logs, or other indications of a roof and very little adobe on the floors of the kivas. The mass of stones in the kivas plainly shows that their walls were formerly much higher. There were no signs of wall plastering, and the unfinished character of the walls

and their size were too small to give a very good idea of details of construction.

Kiva A, situated in the Annex, is the best preserved of all these circular structures, and is surrounded by the highest walls of Sun Temple. It lies embedded in a mass of rooms, the walls of some of which closely follow the outlines of the outer walls. Several of these surrounding rooms have curved walls of fine masonry, and in their

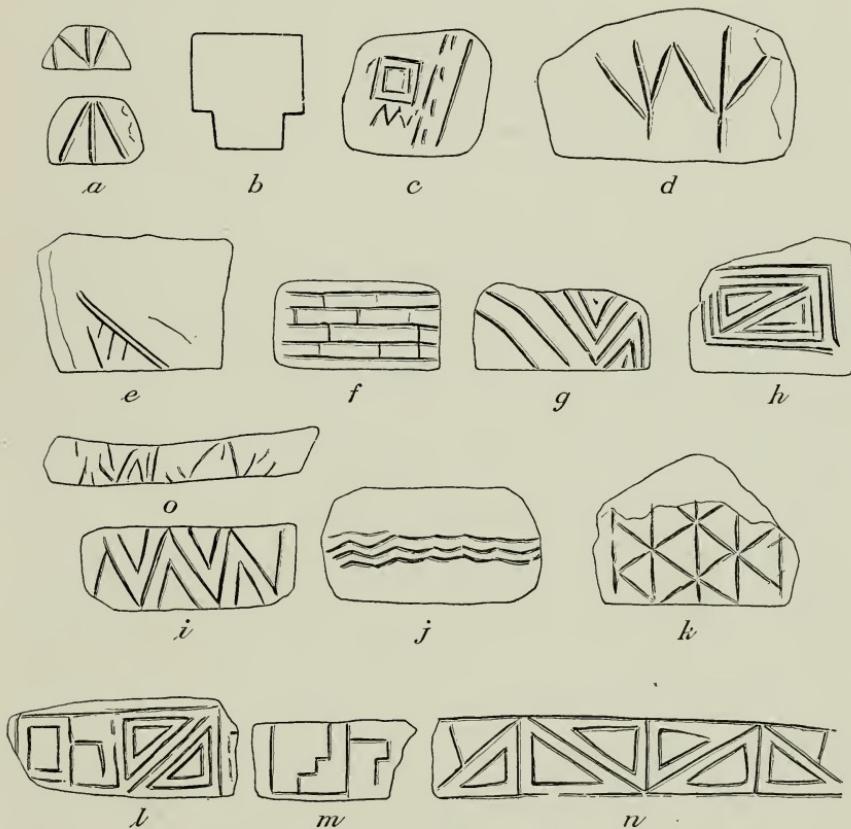


FIG. 4.—TYPICAL DESIGNS ON STONES FROM THE WALLS.

relation to the central kiva remind one somewhat of the double or triple (?) walled "towers" that characterize some of the Mancos ruins. Under the floor of one of these rooms, *z*, south of kiva A, is a passageway that strongly reminds one of a cliff house ventilator with vertical shaft, but there was no indication of a deflector nor fireplace in the kiva floor. The walls of kiva *A* closely resemble the plaza kivas, *B* and *C*, the thick wall of this room being lined with a surface wall constructed of small squared stones, each stone being well laid.

CIRCULAR STRUCTURE OUTSIDE THE MAIN BUILDING.

Slightly south and east of a continuation of the eastern end of the south wall lies a circular building with walls 4 feet thick, which has some resemblance to a kiva, and closely resembles the base of a tower (fig. 1). The commanding site of this structure would seem to favor the theory that it was formerly a lookout, but the few courses of worked stones forming the base of the wall show that it was never erected to any considerable height. From its conspicuous position this building overlooks the great canyon at the south of the mesa and from it one can look down Soda Canyon to Mancos River or across Cliff Canyon to the round tower in Cliff Palace. This was probably intended for a ceremonial room, but may have been a lookout or tower. There is ground to believe that none of the so-called towers of the Mesa Verde, Mancos, or Montezuma valley were observatories, but, like the celebrated "tower" in Cliff Palace, were for ceremonial rites connected with sun worship. The floor of this unfinished circular building is very uneven; it is made by the natural surface of rock in place with projections that rise slightly higher than the level surface of the cliff outside. This building has no indications of fireplace or other essentials of a cliff house kiva, and the inner wall was faced with smaller, well-dressed stones like the kivas of the main buildings.

INCISED MURAL FIGURES.

We find in this ruin numerous examples of an early attempt to embellish the walls of a building by geometrical figures cut in their surfaces. Many cliff houses are known to have their walls painted, but designs sculptured on component stones are rare. Several stones with incised figures were set in the walls, but the majority were found on rocks that had fallen from the top of the walls. No uniformity in their position in the rooms was noticeable, and the figures were not continuous enough to form a band about the room. As a rule, the designs are geometric (fig. 4), not unlike those on painted pottery from the ruins. Roughly speaking, they may be classed in about twelve groups; half of the stones bearing them are still in the walls, and the indications are that the remaining six, picked up in the débris, were once laid on top of the walls. One of the best of those (fig. 4*n*), still in place in the wall, can be seen in the masonry of room *m*, a short distance above the floor. It represents a decorative figure, well known on black and white pottery, and was probably introduced for decorative purposes—cut before it was laid in place.

A figure (fig. 4*c*) representing a ladder leaning against a wall is incised on the left-hand side of the entrance to room *o*. On one side, near it, is an outline of a T-shaped door (fig. 4*b*), above which

is a cross, not very deeply cut in the rock. Near the top of the inner wall of room *g*, on the west side, there is an incised figure (fig. 4*h*), commonly found on pottery and on the inner wall of the southwest corner of the plaza another pattern is obscurely indicated.

On the outside of the building, where the surrounding north wall of the Annex is supposed to have merged into that of the original building, there has been carefully cut the cross already mentioned, as indicating the point of union of the Annex and the original building. Among the figures on fallen rocks is one (fig. 4, *b*) which represents the plan of a wall of masonry; another (fig. 4, *j*) has flowing water depicted on it; others have turkey tracks (fig. 4, *a, d*) and various common geometrical designs (fig. 4, *k, l, m, o*). These stones have been assembled and set in Portland cement near the outer wall of kiva C. The importance of these incised figures on stones set in walls lies in the fact that they seem to indicate an advance in architectural decoration not represented in other prehistoric buildings in the Southwest. They may be regarded as first steps in mural sculpture, a form of decoration that reached such an advanced stage in old ruins in Mexico and Central America. Each figure may have had a special meaning or symbolic significance connected with the room in which it was placed, but the figures seem to me to have been introduced rather for ornament or decorative effect. Their existence would certainly imply that it was not intended to plaster the walls over them, and I think there is a reason to believe that they were cut on the stones before they were laid. One or two similarly incised stones have been reported from walls of the Mesa Verde cliff houses, where, however, their existence is very rare. The fine masonry, the decorated stones, and the unity of plan stamp Sun Temple as the highest example of Mesa Verde architecture.

ROOMS OTHER THAN KIVAS.

There are 24 rooms besides the sacred rooms or kivas in Sun Temple. One of these is circular; the others have various shapes, with a general tendency to rectangular form, as appears in the ground plan. Fourteen of these surround the plaza of the original building, and the remainder inclose kiva A of the Annex.

There is a general similarity in four of these rooms on the south side. These have straight walls, but all the remainder are curved, the masonry in all being somewhat better than that of the outside walls. The floors of these rooms are the solid rock surface of the cliff. There are no remains of adobe floors in any of the rooms, the foundation walls resting directly on a solid rock base.

The rooms in the Annex vary in shape, sometimes conforming with the outside wall of kiva A. Six of them are rectangular, but the

dimensions are unlike those of the rooms adjoining the south wall. One of the latter, *y*, formerly had a doorway opening through the south wall, which, however, was closed. It has been suggested, and certain facts support the belief, that the rooms of the so-called Annex are older than those of the original building, but the balance of evidence is that the Annex, as its name indicates, was erected later. The continuous curve of the north wall, in which no break, doors, or windows can be detected, and the point of union of the original building and Annex, have led others to think that the two divisions were constructed at the same time.

The surfaces of the walls of many rooms (fig. 5) have been rubbed smooth, the marks of pecking on individual stones not being as well



FIG. 5.—INTERIOR OF RUIN, LOOKING EAST. SHOWING CEDAR STUMP.

(Photograph by Fred Jeep.)

shown as on the facing of the outer walls. Roots of trees formerly growing on the ruin have made their way between the courses of stone and can still be seen in the walls.

The stones out of which the walls were constructed were quarried on the mesa top near the ruin and are of the same sandstone as the cliff. They vary in size and in degree of hardness, some specimens being so soft that their surfaces may be rubbed off by hand. On account of the softness of these rocks it was not a difficult feat to fashion them into shape; a few blocks were dressed into perfect cubes, their faces being at right angles. There was an attempt to lay stones of the same thickness in the same course, but often lines of thick stones alternated with stones half as large (fig. 6). Stones were blocked into shape by cutting grooves on opposite faces and

breaking them along the line of the groove with malls or hammers. A large number of stone hammers and pecking stones were found in the neighborhood of Sun Temple; there were in places near the foundations of the walls thick deposits of broken stones. No stone set in the walls was too large to be carried by one person.



FIG. 6.—SOUTH WALL, LOOKING WEST.

(Photograph by Judge Nippert.)

WOODEN BEAMS.

The absence of large wooden beams indicating roofs is a remarkable feature in the architecture of Sun Temple. Very small sticks and logs were found in several rooms, but these were exceptional adding weight to the conclusion that the building was not finished. The builders never added roofs. The few beams used were evidently stripped of bark, cut off with stone implements, aided no doubt by fire, in much the same way as the rafters of cliff houses. When logs

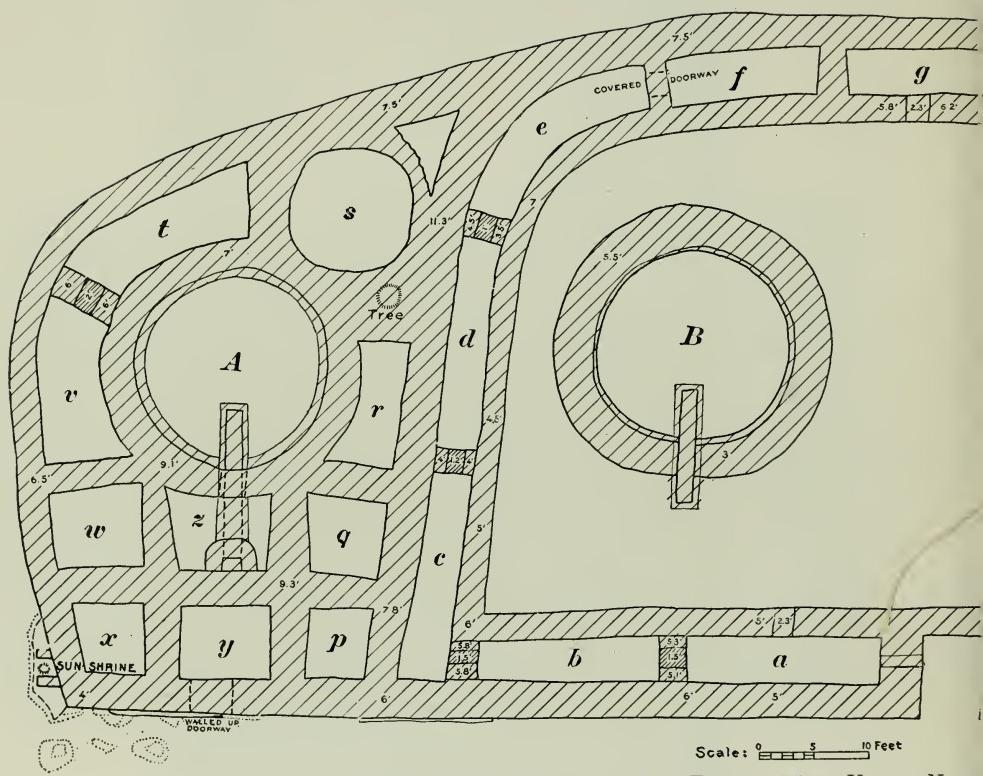
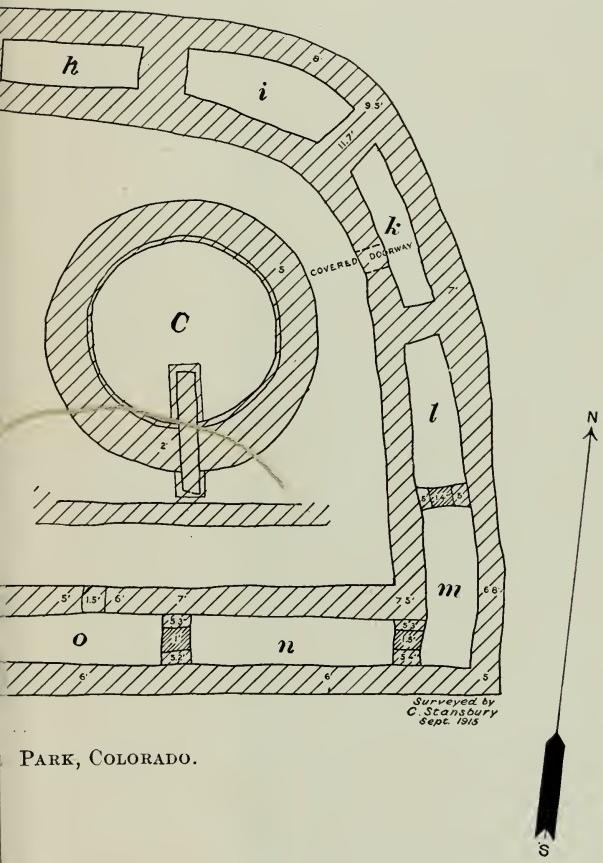
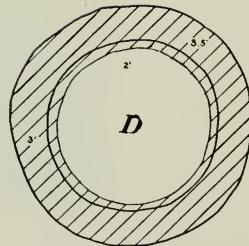


FIG. 7.—GROUND PLAN OF SUN TEMPLE, MESA VERDE NATIONAL PARK.



PARK, COLORADO.



were split they show marks of wedges, their surfaces exhibiting splinters and no evidence of having been cut or planed. Only a few lintels were discovered in position. Some of these simply supported masonry above the doorway leading from one room to another, as *e* and *f*; others no doubt formerly lay on the pilasters of doorways communicating between adjoining rooms, as *a-b*; *b-c*; *c-d*; *o-n*; *n-m*;



FIG. 8.—WEST WALL OF ROOMS *d* AND *e*, SHOWING DOORWAY.

(Photograph by Judge Nippert.)

t-v. The lintels which remained were much decayed and sagged under the weight of the wall above them, so much so that a brace of modern construction was introduced to support them. The lintel that held up the covered doorway of room *r* and that which supported the floor of room *z* above the trench leading into kiva A, were partially intact, but most of the lintels had to be replaced by modern beams, the originals being much decayed (fig. 8).

No signs of ladders were found, although it must have been the intention of the builders to enter the inclosure by some such means, since there are no evidences of external doorways except into the plaza. New ladders were placed at convenient points of the south recess by means of which one may ascend to the top of the south

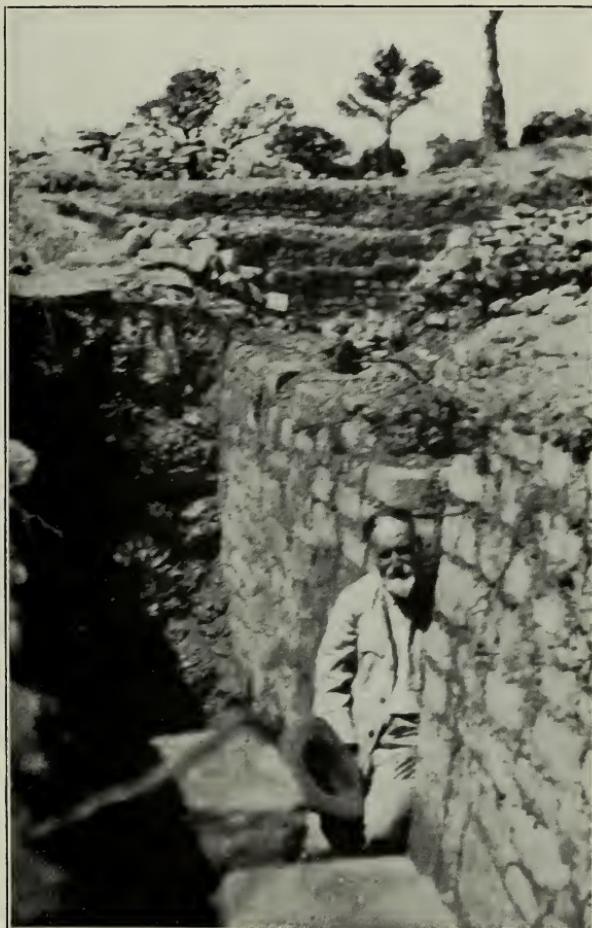


FIG. 9.—WEST END OF ROOM *o*, PARTLY EXCAVATED.

(Photograph by Judge Nippert.)

wall and descend into the plaza opposite. Probably all passageways had stone thresholds and lintels of split logs.

DOORWAYS.

Four of the rooms surrounding the plaza were entered directly by doorways; one of these led into room *a*, others into rooms *g*, *k*, and *o*. The thresholds of the doorways are commonly constructed of large, flat, well-trimmed stones. On each side of the doorway are pilasters (fig. 9) the walls of which are upright and the corners made of good masonry (fig. 9). Evidently all the doorways once had wooden lintels

like those remaining in room *k* or in the passageway from *e* to *f*, but the majority have long since decayed and disappeared. Two openings, the only ones that can be identified as windows, open from the recess in the south wall into rooms *a* on one side and *o* on the other. The wall around the former was strengthened and prevented from falling by insertion of a modern wooden frame. These openings were at first supposed to be doorways, but are so small that we can not regard them as entrances. The window leading into room *o* had a banquette on the west wall. Windows in the recess



FIG. 10.—SUN SHRINE FROM ABOVE.

(Photograph by T. G. Lemmon.)

and not in outside walls impart a mystery to this problematical building.

SUN SHRINE.

One of the most remarkable structures built on the outside walls of the building is near the southwest corner of the Annex. This corner stands on a solid rock that projects about $1\frac{1}{2}$ or 2 feet above the otherwise level foundation of the wall. This cornerstone or foundation of the corner wall protrudes 2 feet beyond the building, and on its upper surface is a fossil with central depressed zone with sharp radiating ridges. The figure (fig. 10) is not artificial,¹ but is possibly helped out by artificial means. A natural object with these charac-

¹ Mr. F. H. Knowlton of the U. S. National Museum, has identified this formation as the fossil leaf of a palm tree of the Cretaceous epoch.

ters would greatly affect a primitive mind, and no doubt was regarded with more or less reverence by the builders of the Annex. At all events they have partially inclosed this emblem with walls in such a way as to inclose the figure on three sides, leaving the inclosure open on the fourth or west side. There can be no doubt that the walled inclosure was a shrine, and the figure in it may be a key to the purpose of the building. The shape of the figure on the rock suggests a symbol of the sun, and if this suggestion be correct there can hardly be a doubt that solar rites were performed about it long before the Sun Temple was built. Practically a person sitting in this shrine on September 21 observes the sun sink below the horizon directly in front of him.

REPAIR AND PROTECTION.

Too strong language can not be used in depreciation of the butchering of architectural features of our southwestern ruins by pot hunters, either private individuals for gain or representatives of institutions under the name of scientific research. Much attention was given to the preservation of the walls of Sun Temple, and the treatment of the walls for this purpose is believed to be unique in this line of work in America. I endeavored to apply the most approved methods of repair and protection, great care and considerable expense being given to prevent destruction of the walls by the elements, in order to preserve them for inspection by students and future visitors.

The main causes of destruction of this ruin were not vandals, as at Cliff Palace, but the elements, especially water. After it was abandoned the tops of the walls were exposed to the sky and unprotected either from snow or rain which sometimes falls in torrents. The snow was particularly damaging, for the water from the melting snow percolated between the facings and the core of the wall, and subsequently froze, forcing the facing of the wall away from the central core until it fell. That this was the main cause of deterioration is shown by the fact that as a rule the outer facing of the surrounding wall was more nearly obliterated to a lower level than the inner, and as a rule the core projected often a foot above faces of the wall. The deleterious cause which early led to the overtopping and destruction of walls would be even more potent when they were excavated. Some means had to be devised to prevent a continuation of their destruction (fig. 11).

Although the walls of the building were so massive that they remained intact to the height of the top of the mound, they were partially held up by an accumulated débris. The removal of earth and fallen rocks weakened them so much that some provision had to be made to counteract this loss of support. In order to prevent the

water from melting snow from penetrating the walls, or the rain from percolating between the core of the wall and its facing, I placed a cap of cement on the tops of all the walls. The inner facing of the outer walls, as a rule, stood a few courses of stone higher than the outer, and it was necessary to add masonry to bring the outer wall to the level of the core and inner facing. Having leveled the top of



FIG. 11.—PART OF SOUTH WALL, PARTLY EXCAVATED.

(Photograph by Judge Nippert.)

the wall, I covered it with small, angular fragments of stone, placing these fragments highest in the middle or over the core. Over this roof-like covering was spread a thick layer of adobe. The top of the wall was thus made in a way to shed water. Over this roof of adobe was spread a layer of Portland cement, 2 inches thick, mixed in proportion of 1 to 5, care being taken to use this cement freely in point-

ing the joints in the facing of the wall in order to prevent the entrance of water in the cracks (fig. 12). The roof shape of this covering or the fact that it is highest in the middle will shed the water and throw it away from the wall without harm. The layer of cement protects the adobe used in pointing the walls and prevents it from being washed from between the stones. Direct action of rain beating on the surface or outside of the wall could not be prevented in this way.

The tendency of visitors to walk on the top of the walls is well known. This act would become a serious menace to a ruin with walls of the magnitude of those of Sun Temple. In order to prevent the



FIG. 12.—CEMENTING WALL OF RECESS IN SOUTH WALL.

(Photograph by Fred Jeep.)

wearing away of the cement by anyone who desired to walk on top of the walls, a row of stepping stones (fig. 13) firmly set in place was provided.

The mass of débris, earth and rocks, constituting the remains of the mound immediately about the ruin was removed and the ground graded for a road. In the progress of this work several trees had to be cut down, a few being left in conspicuous positions to add to the picturesqueness of the surroundings.

The dimensions and other important features of the ruin were plainly marked on the walls with black paint; kivas and other rooms were lettered or designated in the manner adopted at Cliff Palace and Spruce Tree House.

AGE OF THE BUILDING.

The usual question asked by visitors is, What is the age of this ruin? This question is difficult to answer, for it is impossible to tell when Sun Temple was begun, how long it was being built, or when it was deserted. There are indications that its walls were never completed, and from the amount of fallen stones there can hardly be a doubt that when it was abandoned they had been carried up in some places at least 6 feet above their present level. The top of the wall had been worn down at any rate 6 feet, in the interval between the time it was abandoned and the date of my excavation of the



FIG. 13.—WEST ROOMS OF ORIGINAL BUILDING.

(Photograph by T. G. Lemmon.)

mound. No one can tell the length of this interval in years. We have, however, knowledge of the lapse of time since the mound had accumulated enough soil on its surface to support growth of large trees. In the Annex, between rooms *r* and *s*, near the summit of the highest wall, which is 11 feet 3 inches high, there grew a juniper or red cedar of great antiquity, alive and vigorous when I began work. This tree undoubtedly sprouted after the desertion of the building, and grew after a mound had developed from fallen walls. Its roots penetrated into the adjacent rooms and derived nourishment from the soil filling them. Necessarily when these roots were cut off, thereby killing the tree, I was obliged to fell it, but the stump remains, cut off about a foot above the ground (fig. 14). Three hundred and

sixty annual rings were counted on a section of this tree by Mr. Gordon Parker, supervisor of Montezuma National Forest. Its heart is decayed, but its size suggests other rings and that a few more years can be added to its age. It is not improbable that this tree began to grow on the top of the Sun Temple mound shortly after the year 1540 when Coronado first entered New Mexico, but how great an interval elapsed during which the walls fell to form the mound in which it grew, and how much earlier the foundations of the ruined walls were laid no one can tell. A conservative guess of 250 years is allowable for the interval between construction and the time the cedar began

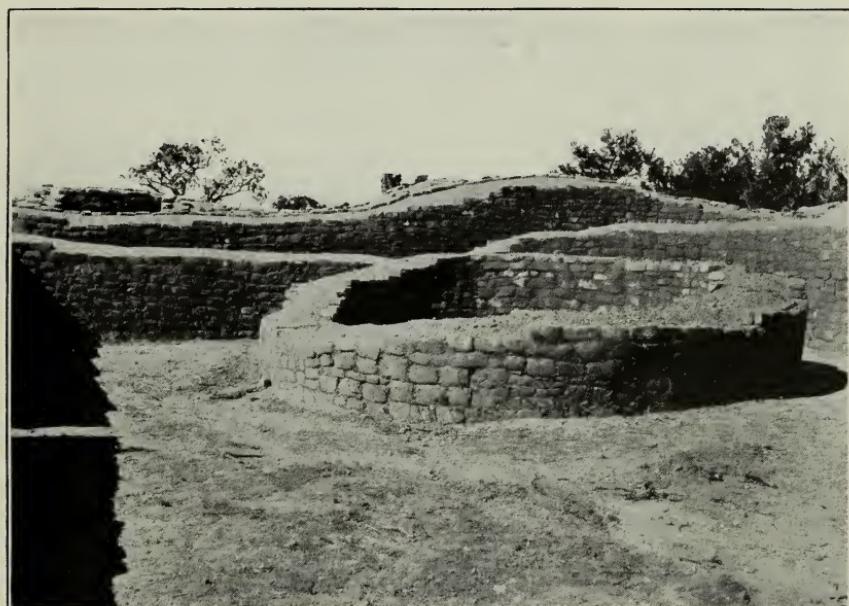


FIG. 14.—WEST END OF PLAZA, SHOWING KIVA B AND STUMP OF OLD CEDAR.

(Photograph by T. G. Lemmon.)

to sprout, thus carrying the antiquity of Sun Temple back to about 1300 A. D.

From absence of data the relative age of Sun Temple and Cliff Palace is equally obscure, but it is my firm conviction that Sun Temple is the younger, mainly because it showed unmistakable evidences of a higher sociological condition of the builders; but here again we enter a realm of speculation which merely adds to the mystery of the building.

Near the northeast curve of the outer wall, about 6 feet above the base level and 4 feet east of the wall itself, there grew another red cedar which had sent a large root through the wall into one of the rooms. A section of this cedar, the trunk of which was tied to the root with wire, can now be seen. It has 332 annual rings, indicating

that over three centuries ago the fallen wall had filled in around the north wall to the depth of 2 yards.

PURPOSE OF THE BUILDING.

Many theories have been advanced to explain the purpose of this structure, but most of these can be eliminated without difficulty. The theory that it was a prison, a Spanish mission, or a theater may be dismissed without serious consideration.

The position of the ruin has led several visitors to suggest that the building was constructed for a fortification for defense against hostile invaders. This theory is not a fanciful one, but while it might have been constructed in part for this purpose, protection from foes was only a secondary consideration. The care given to its construction, its shape and size, absence of portholes, and height of walls are not such as we would expect in a fort.

There is no good evidence supporting the theory that it was erected to serve as a habitation. The rooms have not a form adapted for any such utilitarian purpose. They have no windows, and it was not intended to plaster their walls, as the incised stones clearly indicate; there are no evidences of fireplaces, no smoked walls, no ashes or charcoal, no metates for grinding corn, no piles of débris, such as are usually formed about a habitation. Few households implements, such as bowls and baskets, were found. There were no burials and no animal bones—remnants of former feasts. While it is not impossible that it might have been intended to later add an upper story for dwellings, attention may be called to the fact that, although some of the rooms have walls about 12 feet high, they show no evidence of floor beams or of holes for their insertion. The lower rooms were too high for dwellings, for a dwelling room over 6 feet from floor to ceiling is anomalous in cliff houses or pueblos. It has been suggested that these rooms were intended later for storage, but this theory is highly improbable, for these dark, windowless chambers would be too poorly lighted. The lateral entrances to some of them on the plaza would be an unusual feature, as a series of chambers used for storage rooms connected in this unusual manner are unknown in pueblos. The theory that this building was intended as a dwelling is highly improbable.

The argument that appeals most strongly to my mind supporting the theory that Sun Temple was a ceremonial building is the unity shown in its construction. A preconceived plan existed in the minds of the builders before they began work on the main building. Sun Temple was not constructed haphazard nor was its form due to addition of one clan after another, each adding rooms to an existing nucleus. There is no indication of patching one building to another,

so evident at Cliff Palace, and other large cliff dwellings. The construction of the recess in the south wall situated exactly, to an inch, midway in its length, shows it was planned from the beginning. We can hardly believe that one clan could have been numerous enough to construct a house so large and massive. Its walls are too extensive; the work of dressing the stones too great. Those who made it must have belonged to several clans fused together, and if they united for this common work they were in a higher stage of sociological development than the loosely connected population of a cliff dwelling. In primitive society only one purpose could have united the several clans who built such a structure, and this purpose must have been a religious one. This building was constructed for worship, and its size is such that we may practically call it a temple.

On the theory that it was intended for that purpose we can easily interpret one or two facts that otherwise are without significance. The shrine at its southwest corner stone is worthy of notice in this connection. It bears on its floor a symbol which resembles the sun and which implies complex ceremonies. No one doubts that the three massive, circular walled rooms, two in the main plaza and one in the Annex, are religious rooms, and a glance at the ground plan shows they are prominent architectural features. They show from their prominence that whatever theory of the use of Sun Temple we adopt we must not overlook the ceremonial object. The existence of many rooms entered from the roofs and the absence of external doors in all, implies secrecy. The mysteries here performed were not open to all, only the initiated could enter. Comment has already been made on the fact that practically no household implements were found in the rooms, which has been interpreted to mean that the building was never finished. It also signifies that the workmen did not live in or near by during construction; the question is pertinent, Where did they live? On the theory that this was erected by people from several neighboring cliff dwellings for ceremonies held in common, we may suppose that the builders came daily from their dwellings in Cliff Palace and other houses, and returned at night, after they had finished work, to their homes. The trails down the sides of the cliffs which the workmen used are still to be seen. The place was frequented by many people, but there is no evidence that any one clan dwelt near this mysterious building during its construction.

Other questions arise: Was Sun Temple constructed by an intrusive people of different stock from that of Cliff Palace? Is it the work of a migratory band that entered the region from the valleys surrounding Mesa Verde; or was it built by an alien people not closely allied to those of Cliff Palace, but more like pueblos of New Mexico? The

differences between the architecture of Sun Temple and that of the neighboring cliff dwellings and its similarity in form to some of the ruins in the Chaco Canyon, New Mexico, seems to lend some support to the theory that its builders were aliens, or culturally different from cliff dwellers. This theory seems to me untenable, for where did these incoming aliens live while building it? How could they work there unmolested?

The D form of Sun Temple is practically the same as that of Pueblo Bonito in the Chaco Canyon, and would seem to support the theory of a relation of the builders of both as far as architecture is concerned. But except this superficial likeness in form to the letter D there are only remote resemblances between the forms of Chaco Canyon ruins and that of Sun Palace. The rooms of Pueblo Bonito are numerous and show many evidences of having been used as habitations; they were constructed at different times. Its ground plan shows no unity of action. The kivas of the two have points in common, as a circular form above ground; and kiva C appears to have the beginning of a square surrounding wall, which is a common feature in Pueblo Bonito kivas. The passage under the kiva floor, interpreted by some as a ventilator and by others as a ceremonial opening, are alike in the Chaco ruin and in Sun Temple. The rooms of Chaco Canyon ruins, as figured by Jackson,¹ have none of the characteristic passageways leading from one room to another found in Sun Temple. These doors have no pedestals on each side, such as are found in Sun Temple. The rooms there are arranged in multiple, not single rows. Likenesses to one or two other Chaco Canyon ruins are significant, but hardly adequate to show an identity in culture.

The argument that cliff dwellers in the neighborhood built Sun Temple and that incoming aliens had nothing to do with its construction seems to me very strong. The architectural differences between it and Cliff Palace are not objections, for the architectural form of Sun Temple may be regarded as a repetition, in the open, of a form of building that developed in a cliff house; the rounded north wall (fig. 15) conforms with the rear of a cave and the straight south wall reproduces the front of a cliff dwelling. The recess midway in the south wall of Sun Temple could be likened without forcing the comparison to a similar recess which occurs at the main entrance into Cliff Palace.

Sun Temple was not built by an alien people, but by the cliff dwellers as a specialized building mainly for religious purposes, and so far as known is the first of its type recognized in the Mesa Verde area. I am confident that the group of mounds around a circular

¹ See W. H. Jackson, Report on the Ancient Ruins examined in 1875 and 1877. Chapter II, Ruins of the Chaco Canyon, examined in 1877. Tenth Ann. Rept. U. S. Geol. Geog. Survey Terr.

pueblo, now called a reservoir and known as Mummy Lake, and the great mounds near it, will furnish a key to unlock this mystery, for these show evidences of having been inhabited, and if their ground plans resemble that of Sun Temple, they must be akin to it.

Last of all is the theory that resemblances in Chaco Canyon ruins, situated on a southern tributary of the San Juan River, and ruins on the northern canyons of the same stream, mean that the culture and architectural features of the former are extensions of the latter. Or, stated otherwise, is the mythical place of emergence from the earth, or the well-known sipapu of pueblo mythology, a poetic way of stating a fact in culture history? A consideration of this theory is left to a more appropriate publication.



FIG. 15.—OUTER NORTHEAST WALL.

(Photograph by Fred Jeep.)

RECOMMENDATION FOR FUTURE ARCHAEOLOGICAL WORK IN THE PARK.

It is difficult when so much repair work on the ruins in the park is needed to designate any one ruin in preference to others, but from a scientific point of view I have no hesitation in recommending one line of field work before all others.

The Mesa Verde is unique in its educational importance. It is destined ultimately to be a Mecca for all students of the prehistory of the Southwest and an object lesson to all visitors who wish to see the best preserved buildings of pre-Columbian times in our country. It is self-evident that the excavation and repair of all the ruins in this park can not be accomplished in a few years, even were it desira-

ble to attempt it; the work means many years of arduous devotion, intelligently directed, and a large sum of money. It is desirable to open up these precious remains of antiquity carefully, following a definite plan, availing ourselves of methods acquired by experience. The work should be done with care, and it will be an additional attraction if visitors can see how the work is done.

Three good representations of the type of ruins called cliff dwellings have already been excavated and repaired, viz, Cliff Palace, Spruce Tree House, and Balcony House, to which I have this year added another of the same type, viz, Oak Tree (Willow) House. Although we have always thought of the ruins of the Mesa Verde as cliff dwellings, the work this summer has greatly broadened our ideas of the architecture and hence the culture of the aborigines of Mesa Verde. There has been brought to light a new type, which is a new attraction and adds a new zest to the study. Two or possibly three other types await the shovel and pick of the explorer. The great mounds near Mummy Lake, which itself is a new type of ruin, should be excavated and repaired. Work on the group will reveal important architectural features, and add much to our scientific information. The Mummy Lake cluster of mounds lies on the main road from Mancos, Colo., to Spruce Tree House, and with this advantageous position work here will from its inception arrest the attention of visitors and increase interest in the park. But excavation and repair of the nine large mounds in the Mummy Lake cluster will be a work of greater magnitude than any in this line yet undertaken on the park. I have roughly estimated that the cost of excavating and repairing the whole cluster would not be far from \$8,000, but the work could be distributed through several years, and a fair beginning could be made in one season with \$3,500. I have the honor to recommend that this be the next scientific work on the park.

In addition to the excavation and repair of Sun Palace, I made ladders and trails to Oak Tree (Willow¹) House and Painted House, the two cliff dwellings of size in Fewkes Canyon, following the ancient trail down the precipice on which Sun Temple stands. Oak Tree (Willow) House, which is two-thirds the size of Spruce Tree House, was excavated and repaired and forms a valuable addition to the list of repaired cliff ruins. It has four large kivas, one of which is D-shaped,² and is unique among other ruins in having a granary, the

¹ As there is a conspicuous cluster of oak trees near the east end of this ruin and no willows, I suggest the name Willow House be transferred to the small cliff houses under Sun Temple on the trail below which grow several willow trees.

² This ceremonial room belongs to the second type of circular kivas or those without pedestals for a vaulted roof. This is the same type as the D-shaped tower kivas of Ruin Canyon and the McElmo, and allied to the Annex of Sun Temple.

walls of which were made of plastered osiers covered with adobe, a type of construction not only very unusual in the Mesa Verde Park, but also elsewhere. Many instructive artifacts were found in this ruin. The relation of a D-shaped kiva in a cliff dwelling and the D-shaped ground plan of Sun Palace will be discussed elsewhere.

Painted House, which is a ceremonial court flanked by buildings with painted walls, lies somewhat nearer the head of Fewkes Canyon than Oak Tree House. It is practically a dance plaza without kivas, but with rectangular rooms at each end. The so-called painted room has figures of rain clouds, cacti, men, and animals, forming a kind



FIG. 16.—FIRST AUTOMOBILE TO ROUND THE RUIN, NEAR NORTHEAST WALL.

(Photograph by T. G. Lemmon.)

of frieze visible on three sides. These figures are very much damaged, but enough remains to show that the room in which they occur was probably once used in a ceremony akin to the New Fire Ceremony of the Hopi. The phallic figures which six years ago were conspicuous paintings on the walls no longer exist, having been destroyed by vandals, but there still remains other paintings that are well preserved.

While engaged in the work above mentioned, informal camp-fire talks were given to visitors in which an effort was made to explain the ruins and present related archaeological problems. These talks were well attended, the audience sometimes numbering 20 or 30 per-

sons. In order to facilitate access to Sun Temple a road was constructed around the ruin for automobiles (fig. 16), so that one can now alight a few steps from any point of the walls. The automobiles themselves practically made the road through the cedars to camp.

My report on the fascinating work at the Mesa Verde National Park during the past summer would be incomplete if I did not express my great pleasure in having had the opportunity to uncover a new type of ruin, the discovery of which is a service to American archaeology.



FIG. 17.—SUN TEMPLE, BEFORE EXCAVATION, FROM NORTHEAST.

